important factor in the success of the penetration work. Each piece of stone then has a bearing on others of the same size, and a layer of such stone can be well keyed together by rolling. Mr. Pillsbury, the engineer who has charge of the penetration work in the state of Massachusetts, gives a large part of the credit for the success of this method there to the use of this kind of stone in the wearing surface. If smaller size particles are introduced into the surface, the result is to wedge the larger pieces apart and prevent complete inter-locking and the stability which is obtained with stone of uniform size. It has been observed that with large size stone there is less tendency to ravel even when the life of the binding material is partially destroyed.

Another reason for the use of large stone of uniform size is that it allows better penetration of the binder, even after the top course has been rolled, than is usually secured with a graded stone unrolled. On a surface of this kind a limited excess of bitumen can be used, and this will exist in the road surface as a reservoir of material to enrich the road constantly under the traffic, here it would dry out and ravel with a graded stone merely coated with bitumen. This size of stone requires about 3/8 gallon of bitumen more per square yard per inch of top course, but considering the fact that the binder is the life of the road, the small increase in cost is more than justified by the increased efficiency of the road.

It is most important that the binder be applied uniformly so as to obtain a uniform mixture of the stone and bitumen. This can best be accomplished by machine distribution. A machine which delivers the material in the form of a spray that hits the stone in the road at a high velocity is perferable to one that delivers the material in the form of a sheet under low pressure. A small engine is usually attached to the sprayer to maintain the desired air-pressure.

Since the life of a road is no longer than that of its binder, the material selected should possess the characteristics of cohesiveness, lack of brittleness, and resilience. Although various types of binders have been used with good results, the natural asphalts have almost invariably been preferred for roads carrying the heaviest traffic, because of their greater